

the districts in which the tertiary marine beds appear, some of them being from 2000 to 3000 feet, and others at a still greater elevation above the sea-level. The freshwater tertiaries of Lycia are much more extensive than the marine beds, and extend over the district at heights of 200 or 300 feet above the plain. They consist of marls, capped by flat tables of conglomerate limestone. The relative age of these tertiary beds is determined by the presence of both marine and freshwater strata in the two great valleys of the Xanthus, the former being identified with the Bordeaux miocenes, and the latter therefore being much newer than the eocene freshwater tertiaries of Smyrna. A considerable mass of travertine is found in the great plains of Pamphylia, and it forms cliffs of considerable height, through which the rivers pour. Certain recent changes of level were also noticed, which had attracted the attention of Sir C. Fellows. In conclusion, the authors consider that the scaglia, the formation of most ancient date, was deposited as fine sediment in a deep sea, and was in progress during the whole of the secondary, including the cretaceous, epoch; the evidence of this consisting in the remarkable mixture of fossils observable in Mount Lebanon and elsewhere, and the great thickness, the extent, and the conformable superposition of the different beds. The sandy beds resting on the scaglia seem to have been more recent than the miocene marine strata, the presence of which marks a great change in elevation. This change was more than paralleled by a converse one of depression, producing lakes in which the freshwater tertiary beds were deposited, and which have been since drained by changes in level still going on.

A short notice was read, being the translation of a memoir by the Baron Leopold von Buch, "On a new family of Crinoidal Animals, called *Cystideæ*."

The stony cases of these animals differ from Encrinites chiefly in the absence of arms and the presence of ovarial apertures in the plates. They are found abundantly in the lower beds of the Silurian series, chiefly in Scandinavia.

A paper was read, "On the Relation of the New Red Sandstone to the Carboniferous Strata in Lancashire and Cheshire." By E. W. Binney, Esq.

The author endeavoured to show that the Lancashire coal-field, although of great thickness, does not exhibit a passage upwards into the new red sandstone, but that it is a more perfect series than that in the west of Yorkshire and Derbyshire. He also supposes that the coal-measures are generally thrown down by the various faults, the dislocation being of some extent; that these measures continue unaltered beneath the upper beds; and finally, that the lower portions of the new red sandstone are but imperfectly exhibited in the coal-field in question.

ASIATIC SOCIETY.

June 21.—Sir G. T. Staunton, Bart., M.P., in the chair.

Mr. A. Bettington, of the Bombay Civil Service, read a paper "On certain Fossils procured by himself on the Island of Perim, in the *Ann. & Mag. N. Hist.* Vol. xvi.

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Gulf of Cambay ; more particularly on a Gigantic Ruminant, having some affinities to the Sivatherium and the Giraffe." After adverting to former notices of fossils obtained on this island, the writer described its situation in the midst of the gulf-stream of Cambay, which separates it from the main land, and deposits large quantities of alluvium brought down by the rivers emptying themselves into it. These rivers, in the present day, in the freshes, transport into the Gulf large trees, and the bodies of oxen, deer, bears, and other animals ; and in the great floods of past ages are considered to have brought down and deposited, as now discovered, the remains of ruminants and Pachydermata, some extinct and unheard-of, others having, in the present day, their living congeners in the Indian rivers. The bed from which the writer obtained the fossil specimens exhibited is below the usual water-mark, and inaccessible except at the ebb of spring-tides. A portion only of those obtained were brought to England, the remainder were left in India. The most remarkable of those in this country was a large skull, which is now, by competent judges, pronounced to be the first specimen of a new genus. The mass of conglomerate which contained it weighed about 170 lbs., and the separation of the skull from near 100 lbs. of matrix occupied Mr. Bettington many weeks. The skull, on the whole, is well-preserved, though a portion has suffered from the action of water. The lines of teeth on the two sides of the palate are unconformable ; and it has been conjectured that the head must at this part have suffered from violence, but there is no appearance of fracture. For the purposes of comparison, Mr. Bettington had made a close measurement of every part of the Perim fossil, of the Sivatherium, and of the skull of the adult giraffe in the British Museum ; from all which it appeared that the Perim fossil is the smaller. The teeth are similar in number and character to those of the Sivatherium, and are somewhat smaller, as the comparative size of the heads would lead us to expect. A marked distinction between the two is found in the excess in width of the cranium at the vertex, being in the Sivatherium twenty-two inches, and in the Perim fossil little more than eleven inches, in which character the latter approaches nearer to the giraffe. But the greatest point of difference is in the form and position of the horns. In the Sivatherium the horns bear somewhat the same relation to each other as in the four-horned antelope ; whereas, in the fossil under consideration, the anterior horns rise from a confluent base measuring twenty-five inches, the horns above the line of division measuring eighteen inches. This formation the writer considers to be without precedent in the animal kingdom, fossil or recent. The general character, cancellar structure, and extensive development of the protuberance at the lower edge of the transverse ridge of the occiput, compel the conviction that it was a posterior horn, "reflected" as in the common Indian buffalo, and must have produced an appearance truly monstrous. The whole formation indicates great force and power. Among the other fossils, there were some identical with those of the Sevalik hills, and others peculiar, as yet, to Perim. Among the latter was a new Crocodilean. There were specimens of

three species of mastodon, gariols and rhinoceros, and the heads, horns and teeth of stags, antelopes, oxen, &c. The writer concluded with the observation that there was still a rich field of research remaining at this deposit, and that he had sent to India, not only for some of the specimens before referred to, but was also making arrangements for prosecuting further research.

Dr. Mantell remarked, that the specimens afforded additional confirmation of the fact, first pointed out by Capt. Cautley and Dr. Falconer, that in the tertiary formations of India were collocated the remains of several species of reptiles and mammalia, with those of extinct species and genera belonging to the most ancient European deposits of the same geological group (the *eocene*); as, for example, the teeth and bones of the Cheiropotamus, and other pachyderms of the Paris basin, with those of the existing gariol of India. Dr. Mantell then offered some observations on the analogy which the specimens from Perim, as well as those from Ava and from the Sevalik hills, presented in their mineralogical condition, and the mechanical action to which they had been subjected, with those more ancient fossil bones and teeth that abound in the Wealden deposits of the south-east of England, particularly with those obtained from the conglomerate and grits of Tilgate Forest. The Indian and the British fossils are alike mineralized by iron, and have an investment of indurated ferruginous sand, interspersed with quartz, pebbles and rolled fragments of other rocks; and the bones are, for the most part, mutilated and much water-worn, proving that previously to their mineralization they had been exposed to abrasion from streams and rivers, and were transported from a great distance by currents. Dr. Mantell dwelt on the discrepancy between the faunas of the two epochs, although that of the Wealden was as decidedly of a tropical character as that of the tertiary strata of India; but in the latter large mammalia prevailed, while in the far more ancient secondary formation of England mammalia were absent, and the place of the gigantic ruminants and pachyderms was occupied by herbivorous reptiles of appalling magnitude.

BOTANICAL SOCIETY OF EDINBURGH.

May 8, 1845.—Dr. Sellar, V.P., in the Chair.

A collection of British specimens was announced from the London Botanical Society; and fresh specimens of a *Primula*, regarded as the *P. elatior* of Jacquin, from Dr. Dewar, Dunfermline, were placed on the table.

The following papers were read:—

1. "On some species of *Cuscuta*." By Charles C. Babington, M.A., F.L.S. &c., Cambridge. (Ann. Nat. Hist. p. 1 of the present volume.
2. "On the genus *Diodium*, Breb." By John Ralfs, M.R.C.S. &c., Penzance.

June 12.—Dr. Douglas Maclagan, President, in the chair.

The following communications were read:—

1. "List of the rarer Lichens found in the neighbourhood of